DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ROCK ISLAND DISTRICT
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ROCK ISLAND, ILLINOIS 61204-2004

CEMVR-PM-M

21 June 2022

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Mississippi Valley Division (CEMVD-PDM/Riggs), PO Box 80, 1400 Walnut Street, Vicksburg, Mississippi 39181-0080

SUBJECT: NESP Fish Passage - Lock and Dam 22, Navigation and Ecosystem Sustainability Program, Ralls County, MO, Review Plan (RP)

1. The subject RP is enclosed for MVD's review and approval. The RP was prepared in accordance with ER-1165-2-217 using the MVD Model RP.

2. The project is in the Design stage of Implementation Phase. The enclosed RP is for the implementation document titled, *NESP Fish Passage - Lock and Dam 22, Navigation and Ecosystem Sustainability Program, Ralls County, MO, Project Information Report*. An electronic copy of the RP has been sent to Ms. LeeAnn Riggs, CEMVD-PDM.

3. The point of contact for this action is Mrs. Rachel Hawes, Project Manager, [redacted] or email: [redacted]

JESSE T. CURRY
COL, EN
Commanding

Encl
1. NESP Fish Passage-LD 22
Ralls County, MO, RP

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
1400 WALNUT STREET
VICKSBURG MS 39180-3262

CEMVD-PDM

MEMORANDUM FOR Commander, Rock Island District

SUBJECT: Approval of the NESP Fish Passage – Lock and Dam 22, Navigation and Ecosystem Sustainability Program, Ralls County, MO, Review Plan

1. References:

a. USACE, CEMVR-PM-M memorandum (NESP Fish Passage – Lock and Dam 22, Navigation and Ecosystem Sustainability Program, Ralls County, MO, Review Plan (RP)), 21 June 2022 (Encl)

b. ER 1165-2-217 (Water Resource Policies and Authorities CIVIL WORKS REVIEW POLICY), 1 May 2021

2. The enclosed implementation Review Plan (RP) for the NESP Fish Passage – Lock and Dam 22, Navigation and Ecosystem Sustainability Program, Ralls County, MO has been prepared in accordance with ER 1165-2-217 and has been coordinated with our staff who concurred with the RP.

3. We hereby approve this RP, which is subject to change as circumstances require, consistent with project development under the Project Delivery Business Process. Non-substantive changes to this RP do not require further approval. Substantive revisions to this RP or its execution will require new written approval from my office.

4. My point of contact for this action is LeeAnn Riggs, CEMVD-PDM, [redacted], or [redacted]

DAVIDSON.D[redacted]
ONNY.D.[redacted]
[redacted]

Encl

DONNY D. DAVIDSON, JR, P.E.
Acting Regional Business Director

REVIEW PLAN

NESP Lock and Dam 22 Fish Passage Improvement Project

Rock Island District

MSC Approval Date: *TBD*
Last Revision Date: *(date of last revision AFTER approval)*

ENDORSED BY:

MARTIN.AUGUST.WAYNE.[redacted]

AUGUST W. MARTIN, P.E. DATE
Chief, Engineering and Construction Division

APPROVED BY:

DAVIDSON.DONNY.D[redacted]

DONNY D. DAVIDSON, JR, P.E.
Acting Director, Regional Business DATE

IMPLEMENTATION REVIEW PLAN

NESP Lock and Dam 22 – Fish Passage Improvement Project

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1. PURPOSE AND REQUIREMENTS

1.1. General. This review plan (RP) defines the scope and level of review for implementation documents developed for the *NESP Lock and Dam 22 Fish Passage Improvement Project (Project)*. Reviews required to be performed for this Project are discussed herein. The implementation documents to be reviewed under this RP are the Plans and Specifications (P&S) and Design Documentation Report (DDR).

1.2. References

(1) Engineer Regulation (ER) 1165-2-217, Civil Works Review Policy, 01 May 2021

(2) ER 415-1-11, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Reviews, 01 Jan 2013

(3) ER 5-1-11, USACE Business Process, 31 Jul 2018

(4) MVR Quality Control (QC) and Review Process, 2021 Mar 2021

1.3. Documents Distributed Outside the Government. For information distributed for review to non-governmental organizations, the following disclaimer shall be placed on documents, *"This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It has not been formally disseminated by USACE. It does not represent and should not be construed to represent any agency determination or policy."*

2. PROJECT INFORMATION

Lock and Dam 22 is located at river mile 301.2 on the Upper Mississippi River (UMR) near Saverton, Missouri, between Ralls County, Missouri, and Pike County, Illinois. The average lift at Lock and Dam 22 is approximately 11 feet. The Project area is located in Congressional District 9 in Missouri and District 17 in Illinois. The Project is 100% Federal funded and there is no non-Federal sponsor.

The need for the Lock and Dam 22 fish passage was identified in the Final Integrated Feasibility Report (FIFR) and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study U.S. Army Corps of Engineers, September 24, 2004 (2004 Feasibility Study) to meet the ecosystem restoration needs of the system. Project is the first of a series of projects to restore longitudinal habitat connectivity for the many species of native migratory fishes in the UMR. Enabling long distance migration is important to fulfill seasonal and life stage requirements for river fishes. Fish undergo seasonal movements in rivers for reproduction, feeding, and for finding thermal refugia during winter. Fish migrations are the annual movements of fish populations between different habitat areas. Fish passage is the movement of fish past an obstacle, such as a dam in a river, and fishways are constructed channels designed to provide hydraulic connections suitable for fish to pass dams without undue stress, delay or injury.

The primary purpose of the Project is to increase opportunity for upriver fish passage, thereby

increasing access to upstream mainstem river and tributary habitats. Increased access to upriver habitat should result in an increase in the size and distribution of native migratory fish populations. The secondary purpose of this Project is to monitor, evaluate, learn from, and adapt future fish passage projects using lessons learned from this initial Project. There are significant gaps in knowledge for this Project given our limited understanding of: natural fish movements, fish movements in response to flow conditions, the diversity of fish species and their habitat requirements, and the novelty of a fish passage for the UMR. This information is needed for project planning and design to determine if the Project objectives are met and to apply lessons learned to future fish passage projects through adaptive management.
The Project includes a rock ramp with 200 foot bottom width, resulting in a gain of 234.6 average annual habitat units. The rock ramp will cross the dam embankment. The rock ramp will require excavation into the embankment. The Project First Cost is $122,110,000 at a FY 2021 price level (Oct 2020). The costs are expressed as Project First Costs and include construction, contingencies, engineering, preconstruction engineering, and design, and construction management. When interest during construction is added, the total investment cost is $126,712,000.

Utilizing the services of an Architect/Engineering (AE) firms, a single construction project will be implemented for the primary components of the fishway. The AE will develop plans, specifications, design documentation report, and cost estimate for the initial construction of the project. The 0-35% design was completed in one contract by an AE firm (Joint Venture) in 2022, and 35%-100% design is being completed through another contract (utilizing the same AE firms) anticipated being awarded in 2022. Design work for these primary features will include the following components:

- *Rock Ramp Fishway.*
- *Ice And Debris Boom.*
- *Bridge System With A Water Control Structure.*
- *Permanent Docking/Mooring area.*
- *Site Access and Staging.*
- *Integrated monitoring systems.*
    - *Passive Integrated Transponder (PIT) Tag Array.*
    - *Split Beam Hydroacoustics.*
    - *Multibeam Hydroacoustic.*
    - *Acoustic Doppler Current Profiler (ADCP).*
    - *Cabled Hydrophone Telemetry.*
- *Equipment Center and Research Deck (ECRD).*
- *Electrical and Network Design.*

Following construction of the components listed above, a series of experiments will be conducted to determine the appropriate width, flow, boulder placement in riffles, and hydraulic conditions that enable migratory fish to best pass through the fishway to aid in the design of other fishways. To accommodate these experiments, the fishway shall be designed with the: ability to control horizontal, lateral, and vertical flows; and the ability to adjust monitoring equipment locations during experimentation. These experiments may be designed by either in house or AE design labor.

3. REVIEW MANAGEMENT ORGANIZATION (RMO)

The RMO for this Project is the *Mississippi Valley Division (MVD)*. The RMO will assure that an ATR team is assembled in accordance with this RP. The RMO will review the ATR report and sign the accompanying completion statement at the completion of the ATR.

4. RISK ASSESSMENT DURING DESIGN

Risk assessments during design will be performed in accordance with ECB 2019-15. The risk assessment scope, process, and team as well as review activities associated with the risk assessment are defined in this RP. Once the risk assessment during design is completed, this RP will be re-visited by the District, MSC, and RMC to determine if review requirements for the work products need to be revised.

The design risk assessment will be performed and staffed as described in Attachment 1. The dam safety risk assessment was performed by a team led by MVR. Memo dated 24 November 2020 was incorporated in the PIR final report, appendix E.

The design risk assessment will be reviewed by a small team composed of subject matter experts deemed appropriate for the Project. The design risk assessment review will determine if there is a major risk concern, if there is a controversial process being used or if there will likely be a design deviation request. The determination to present a design risk assessment to the LSOG/DSOG will be coordinated through the RMC.

The risk assessment completed near the end of construction will be reviewed by a full risk assessment review team, the review team will be composed of an ATR Lead, Geotechnical Engineer, Hydraulics and Hydrology Engineer, Structural Engineer, and Consequence specialist; the same review team will be used for the risk assessment, design, and construction documents to the maximum extent possible. The District LSO/DSO will be a member of the DQC team for risk assessments. The final risk assessment products and decision documents will be presented to LSOG/DSOG as deemed necessary, the timing of this submission to LSOG/DSOG will be coordinated with the RMC.

5. DISTRICT QUALITY CONTROL (DQC)

The Rock Island District will complete a DQC on all District responsible documents for this project. Documents may include design for Adaptive Management Experiments and performance monitoring of the fishway.

5.1. General. The *Rock Island* District (District) will manage the DQC Reviews. All reviews will be performed and documented in accordance with ER 1165-2-217 and the District's quality manual. All comments and their resolutions from all DQC Reviews will be provided to the ATR team so that the ATR team can determine whether an adequate DQC was performed. The DQC Reviews will consist of Informal Quality Checks and more formal Milestone Reviews.

5.2. Informal Quality Checks. The Informal Quality Checks will be performed by peers not actively involved with project delivery. The Informal Quality Checks reviews will not have a formal schedule or a formal team but will be certified and documented. These Informal Quality Checks will be performed throughout the life of a project, specifically at key decisions/milestones (e.g., hydraulic and geotechnical parameters, technical memorandums, technical appendixes, or other standalone products). At a minimum, for this Project, the following will be certified complete before follow-on work is started: *documents, computations, and graphics that will be certified.* The sample certification sheet found in ER 1165-2-217 will be used to certify the Informal Quality Checks reviews.

5.3. Milestone Reviews. The Milestone Reviews will be performed as shown in the schedule in *Attachment 2*. DrChecks comments and resolutions to the comments will serve as documentation for the Milestone Reviews. Milestone Reviews will consist of Project Delivery Team (PDT) reviews and Independent DQC Reviews.

5.3.1. PDT Reviews. PDT Reviews will be performed by team members actively involved in project delivery. The PDT has been assigned a Technical Lead in accordance with ER 5-1-11. The PDT members and disciplines are shown in the tables in *Attachment 2*.

5.4. Independent DQC Reviews. The Independent DQC Reviews will be performed by reviewers NOT actively involved in the project delivery. The Independent DQC team has been assigned a DQC Review Lead in accordance with ER 1165-2-217. The Independent DQC reviewers and disciplines are shown in the tables in *Attachment 2*. Sample statements for comment resolution and certification is included in Attachment 5.

6. DISTRICT QUALITY ASSURANCE (DQA)

The Rock Island District has elected to have an AE firm complete all documents and analyses in which they are responsible for this project.

All documents (including plans, specifications, cost estimates, and Design Documentation Reports) shall undergo District Quality Assurance (DQA) in accordance with ER 1165-2-217. The District shall perform these minimum required reviews in accordance with the District's Quality Management Plan.

The AE will conduct Quality Control (QC) on their analyses, data, reports, designs, and plans and specifications.

The Rock Island District will conduct DQA reviews on the AE's products and QC. The DQA reviews will ensure the AE's QC was adequate, including an assessment of informal quality checks and reviews, more formal PDT reviews. All formal reviews and will be documented using DrChecks and certified.

Since Rock Island District is not developing the plans and specifications but instead performing DQA, it is appropriate for the Technical Lead to also serve as the DQA Lead. The entire PDT will participate in DQA reviews.

7. BIDDABILITY, CONSTRUCTIBILITY, OPERABILITY, ENVIRONMENTAL, AND SUSTAINABILITY (BCOES) REVIEW

7.1. General. The BCOES reviews will be performed and documented in accordance with ER 415-1-11.

7.2. Team Members and Schedule. The BCOES reviews will be performed as shown in the schedule in *Attachment 3*. The BCOES team members are shown in the tables in *Attachment 3*. DrChecks comments and resolutions to the comments will serve as documentation for the BCOES review. Sample statements for comment resolution and certification is included in Attachment 5.

8. AGENCY TECHNICAL REVIEW (ATR)

8.1. General. The *Rock Island* District will contact the RMO as soon as possible after RP approval to assign an ATR Lead who will in turn assemble an ATR team. Assembling the ATR team early will ensure early involvement of the ATR team as required in ER 1165-2-217. The ATR team will perform and document the review in accordance with ER 1165-2-217. The ATR Lead will be from outside MVD and the team members will be from outside of the District performing the design. Each ATR reviewer will be required to submit at least one comment. If a reviewer has no comment, the reviewer will be required to enter a "no comment" so that is can be documented that the reviewer participated in the review.

8.2. Review Schedule. The review schedule is shown in *Attachment 4*.

8.3. ATR Report. After each scheduled ATR, the ATR Lead will produce an ATR Review Report in accordance with ER 1165-2-217. The final report, which will be a compilation of all ATR reports, will be submitted to the RMO for review and signature of the accompanying Statement of Completion of ATR. The District will then complete and sign a Certification of ATR. Sample Statements of Completion and Certification of ATR are shown in *Attachment 6*.

8.4. Required Disciplines and Expertise of ATR members. ATR team members and their expertise that qualified them as ATR team members in their specific discipline are shown in *Attachment 4.* For all disciplines identified, ATR Reviewer without current CERCAP certification are acceptable if they were previously certified in the old system and are currently going through the process of getting certified, but are not yet certified. One reviewer with Design Risk Assessment experience should be identified and selected for the ATR team.

8.4.1. ATR Lead - will be from outside the home MSC and with have extensive

experience in conducting ATRs, leading virtual team through the ATR process, and preparing ATR reports.

8.4.2. Geotechnical Engineer –The Geotechnical Engineer shall be certified in CERCAP in the Geotechnical, Geology & Materials CoP under the FRM and NAV – Dam and Levee Design and Construction area of expertise.

8.4.3. Hydraulic Engineer –The Hydraulic Engineer shall be certified in CERCAP in the Hydrology, Hydraulics & Coastal Engineering CoP under the Hydraulics – Inland Navigation area of expertise.

8.4.4. Mechanical Engineer –The Mechanical Engineer shall be certified in CERCAP in the Mechanical Engineering CoP under the Civil Works Facilities area of expertise.

8.4.5. Structural Engineer –The Structural Engineer shall be certified in CERCAP in the Structural Engineering CoP under the Specialty Areas – Bridge Design/Load Rating area of expertise.

8.4.6. Civil Engineer – The Civil Engineer shall be certified in CERCAP in the Civil Engineering CoP under the Specialty Areas – Ecosystem / Large River Systems area of expertise.

8.4.7. Biologist – The Biologist shall be certified in CERCAP in the Biological CoP under the Specialty Areas – Large River Systems and Fish Behavior area of expertise.

8.4.8. Electrical Engineer – The Electrical Engineer shall be certified in CERCAP in the Electrical Engineering CoP under the Specialty Areas – Electrical area of expertise.

8.4.9. Architect – The Architect shall be certified in CERCAP in the Architect CoP under the Specialty Areas – Building Design area of expertise.

	ATR Lead	Geotechnical	H&H	Mechanical	Structural	Civil	Biologist	Architect	Electrical
Draft Geotechnical Report	X	X							
ATR 35% Review	X	X	X	X	X	X	X	X	X
Design Risk Assessment Report	X	X							
ATR 65% P&S Review	X	X	X	X	X	X	X	X	X
ATR 95% P&S Review	X	X	X	X	X	X	X	X	X

ATR During Construction	X	X	X	X	X	X	X	X	X
Final Risk Assessment Report	X	X							

9. TYPE II IEPR/SAR

The District's Chief of Engineering has determined that a Type II IEPR/SAR is not required for this Project. The signed memo justifying the rationale not to conduct a Type II IEPR/SAR is shown in *Attachment 7*.

10. REVIEW PLAN APPROVAL AND UPDATES

10.1.Approval. This RP will be approved by the MSC Commander or a designated official. It will have the endorsement of the District and MVD Engineering and Construction Division Chief prior to being submitted for approval.

10.2.Updates. This RP is a living document and will be revised as necessary throughout the design phase. Minor revisions will not require reapproval and will be documented using the table in *Attachment 8*. If major revisions such as a change in scope of the Project or change in the review levels are necessary, the RP will be submitted for re-approval.

11. REVIEW PLAN POINTS-OF-CONTACT

The following are the points of contact for this RP:

Rachel Hawes, Project Manager, Rock Island District, [redacted]
LeeAnn Riggs, District Support Team, Mississippi Valley Division, [redacted]

ATTACHMENT 1 – PROJECT RISK INFORMATION

This RP will be updated with additional project risk information once the risk assessment during design is completed; these updates will be tracked in the table in Attachment 8 and coordinated with the LSC and MSC.

A dam safety risk assessment on this Project has been completed and Headquarters (HQ) approved it as a DSAC 5. There is no life safety risk and consequences are solely economic, based on impacts to navigation. This Project will not increase the risk or have any influence on a future DSAC reclassification.

Modifications to existing dams can impose additional dam safety risks to people and property upstream and downstream of the Project. Risk is defined as a function of the loading condition, expected performance of the dam, likelihood of failure, and the expected consequences. Risk increases with an increase in the likelihood of failure or an increase in the potential consequences. Modifications to existing dams should not increase the risks associated with the Project.

USACE has implemented a Periodic Assessment (PA) program to assess the risks associated with a dam failure at all projects across the inventory. The results of the periodic assessment are used to re-evaluate the DSAC rating assigned during the previous Screening for Portfolio Risk Analysis (SPRA) process. Dam safety risks include life loss and economic consequences associated a dam failure. The PA program also informs the hazard potential classification, the rating for each dam based on the potential consequences of failure. Dams classified as High Hazard Potential will result in the loss of life as a result of failure. Significant Hazard Potential dams will result in a disruption of essential or critical facilities or access, major or extensive property losses to public and private facilities, or major or extensive environmental losses where mitigation is required or impossible.

Lock and Dam 22 went through a PA in 2018 as a Significant Hazard Potential dam and the results of that risk assessment can be found in the Lock and Dam 22 (MO10305) Mississippi River, Missouri Navigation Lock & Dam Periodic Inspection No. 11 Periodic Inspection Assessment NO. 01 report. The PA re-evaluated the deficiencies and failure modes identified in the 2008 SPRA and identified additional potential failure modes (PFMs) that could result in the loss of damming surface (i.e., loss of pool) or a loss of navigation due to an emergency closure of the lock for an extended period of time. The PA identified 44 PFMs during the risk assessment. Those PFMs with the highest risk were carried forward as risk drivers and used to create a risk matrix and inform the DSAC. The risk driver PFMs identified at Lock and Dam 22 include a barge/vessel accident that blocks one or more dam gates from closing, a trunnion friction failure of a Tainter gate, a barge impact of the main lock chamber miter gates resulting in a loss of service of the lock, and a miter gate embedded anchorage fatigue failure resulting in a loss of service of the lock. None of the risk drivers were associated with the overflow spillway or the storage yard embankment.

The 2018 PA conducted at Lock and Dam 22 did not include an assessment of the fish passage feature as this feature was not a part of the Project at the time of the risk assessment. To address the dam safety concerns of the fish passage feature, a Potential Failure Mode Analysis (PFMA) was performed as part of the FIFR to identify PFMs associated solely with the Project. This

analysis followed the USACE risk-informed design process but was completed using only Rock Island District personnel and did not determine the potential consequences associated with these PFMs. PFMs were identified and justification for excluding them as risk drivers were documented or design considerations were listed to be addressed by the design team. The fish passage structure does not increase the risks at the dam and does not change the hazard potential classification.

Table 1: Factors and project specific relevance

Factor		Relevant to This Project
1) Is the project justified by life safety?	Mandate	No. The 2018 Periodic Assessment for this project resulted in an HQ-approved DSAC 5. The PA found no life safety risk and consequences are solely economic, based on impacts to navigation. In 2020, CEMVR conducted a risk-informed design PFMA considering the PFMs associated with the fish passage project. Many PFMs were discussed. The team concluded, "The fish passage structure does not increase the overall risk at Lock and Dam 22 as determined by the 2018 PA."
2) Would the project's failure pose a significant threat to human life?	Mandate	No. The 2018 Periodic Assessment for this project resulted in an HQ-approved DSAC 5. The PA found no life safety risk and consequences are solely economic, based on impacts to navigation. In 2020, CEMVR conducted a risk-informed design PFMA considering the PFMs associated with the fish passage project. Many PFMs were discussed. The team concluded, "The fish passage structure does not increase the overall risk at Lock and Dam 22 as determined by the 2018 PA."
3) Does the project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices?	Consider	Materials and techniques employed in the construction of the fish passage are commonly used on Upper Mississippi River lock and dam projects.

4) Does the project design require redundancy, resiliency, or robustness?	Consider	The project design has redundancy applied in a biological aspect to help control ANS. LD 22 including the fish passage project does not have life safety implications, will not include remote operations, and has low risk associated with critical infrastructure protection and resilience. Therefore, the fish passage project design does not require redundancy, resiliency, or robustness.
5) Does the project have unique construction sequencing or a reduced or overlapping design construction schedule?	Consider	The construction is routine using proven construction methods.

Table 1 Risk Assessment Team

Discipline/Role	Name	Description of Credentials
Facilitator	Josh Cackley, P.E.	*Rock Island District Dam Safety Program Manager*
RMC/LSC Advisor(s)	Brad Arcement, LSC	*A senior Engineer with experience in dam safety and/or levee safety evaluations.*
Geotechnical	Matthew Stewart, P.E.	Chief of Geotechnical Branch, Rock Island District (CEMVR-EC-G)
Geotechnical	Charles Bishop, P.E.	Section Chief Foundations and Instrumentation Section (CEMVR-EC-GF), Rock Island District

ATTACHMENT 2 – DQC TEAM MEMBERS AND SCHEDULE

DQC MILESTONE REVIEW SCHEDULE

ITEM	BEGIN DATE – END DATE
Initial PDT and Independent DQC Team Review *for P&S & DDR*	*December 2021 – March 2022*
35% PDT and Independent DQC Team Review *for P&S & DDR*	*August 2022 – September 2022*
Design Risk Assessment Report	*August 2022 – September 2022*
65% PDT and Independent DQC Team Review *for P&S & DDR*	*March 2023 – May 2023*
95% PDT and Independent DQC Team Review *for P&S & DDR*	*October 2023 – January 2024*
Final Design Risk Assessment Report	*October 2023 – January 2024*

PDT MEMBERS / DISTRICT QUALITYASSURACE TEAM AND EXPERTISE

PDT Members/Disciplines	Description of Credentials
Technical Lead/DQA Lead *Kara Mitvalsky, P.E.*	*A senior Civil/Environmental Engineer with experience in large river ecosystem and complex restoration projects.*
Project Manager *Rachel Hawes*	*A project manager with experience in Corps business delivery model and project deliverables.*
Lead Biologist *Mark Cornish*	*A senior Environmental Specialist with experience in large river ecosystem and wetland complex restoration projects and policy requirements.*
Hydrologic Engineer *Matt Zager, P.E.*	*Senior H&H Engineer with experience in complex wetland restoration projects, river systems modeling using HEC-RAS, and regulated flow frequency analysis.*
Hydrologic Engineer *Lindsay Matthews*	*An H&H Engineer with experience in complex wetland restoration projects, river systems modeling using HEC-RAS, and regulated flow frequency analysis.*
Geotechnical Engineer *JW Copeland, P.E.*	*A senior Geotechnical engineer with knowledge of working on the river and working with dredging, sedimentation, and river construction*
Environmental Engineer *Tara Gambon, E.I.T.*	*A Civil/Environmental Engineer with experience in large river ecosystem and complex restoration projects*
Technical Manager, INDC *David Lovett, P.E.*	*An engineer with experience in large river ecosystems and designing and maintaining structures in large river systems. A subject matter expert in inland waterways navigation.*
Structural Engineer (Civil) *Cole Clements, E.I.T.*	*A Structural Engineer with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*
Archaeologist *Kelsey Meyers*	*A senior Cultural Resource Specialist (this review may be combined under Environmental Resources).*
Planner *Katie Opsahl*	*A senior water resources planner with experience in wetland complex restoration projects and CAP program processes and policy requirements.*
Cost Engineer *Sarah Auvenshine, P.E.*	*A cost engineer with experience in large river ecosystem and wetland complex restoration projects*
Realty Specialist *Martha Cox*	*A Realty Specialist with experience in Federal lands and MOUs.*
Economist *Matt Napolitano*	*A senior Economist with experience in non-structural cost projection and CAP program processes and policy requirements.*
Structural Engineer - Operations *Jeff Tripp, P.E.*	*An operations structural engineer with experience in large river ecosystems and designing and maintaining structures in large river systems.*
Lock Master #22 *Josh Hathaway*	*An operations representative with extensive knowledge of the Lock and Dam 22 Structure.*

Office of Council *Caitlin Breedlove*	*A District Council representative with experience in legal review.*
CAD Technician *LaShell Harper*	*A CAD technician with experience in large river ecosystem and designing structures in large river systems.*
Structural Engineer *Alex Campbell, P.E.*	*A Structural Engineer with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*
Geographer *Amy Kuhel*	*A GIS Specialist with experience in large river ecosystem and complex restoration projects.*
Hydraulic Engineer, EC-HH *Aaron Buesing, P.E. (Engineer without Borders)*	*H&H Engineer with Mississippi River experience and modeling software utilized (over 10 years' experience)*
HTRW Specialist, EC-DN *Steve Gustafson, P.G.*	*HTRW Specialist (over 10 years' experience), experience performing and analyzing phase 1 HTRW assessments.*
Survey, EC-T *Brent Skidmore, PLS*	*A survey representative with experience in large river ecosystems and designing structures in large river systems.*
Construction, EC-C *Mark Pratt, P.E.*	*A senior construction representative with experience in building various types of structures along the river.*
Contracting, CT *Natalie Werthmann*	*A contracting representative with experience in contractual requirements and specifications for structures along the river.*
Contracting, CT *Liz Dennison*	*A Senior contracting representative with experience in contractual requirements and specifications for structures along the river.*
Specifications, EC-TE *Jody Schmitz*	*A specifications representative with experience writing design specifications for structures along the river.*
Architect *Steve Bothell, Registered Architect*	*An Architect with experience in designing structures in large river systems.*
Mechanical Engineer *Austin Unertl*	*A Mechanical Engineer with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*
Electrical Engineer *David Tepen, P.E.*	*An Electrical Engineer with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*
Biologist *Collin Moratz*	*A Biologist with experience in large river ecosystem and wetland complex restoration projects and policy requirements.*
Biologist *Kyle Bales*	*A Biologist with experience in large river ecosystem and wetland complex restoration projects and policy requirements.*
DQC Review Lead *Alaena Ensey P.E.*	*The DQC Lead will have no production role in the Project.*

INDEPENDENT QUALITY CHECKS REVIEWERS AND EXPERTISE

Members/Discipline	Description of Credentials
DQC Review Lead *Alaena Ensey, P.E.*	The DQC Lead will have no production role in the Project.
Civil Engineer, EC-DN Andrew (Drew) Mitchell	*An experienced Civil/Environmental Engineer*
CAD Technician, EC-DM Missi Manternach	*An experienced CAD technician*
EC-DN Internal Reviewer Emily Johnson	*A CAD technician with experience in large river ecosystem and designing structures in large river systems.*
Biologist, PD-P Steve Clark	*A senior Environmental Specialist with experience in large river ecosystem and policy requirements.*
Survey, EC-T Charles E. Selfe (Ed)	*An experienced survey representative*
Construction, EC Jeff Shepherd	*A senior construction representative with experience in building various types of structures along the river.*
HTRW Specialist, EC-DN Andrew McClanahan, E.I.T	*An HTRW Specialist*
Structural Engineer, EC-DS Brant Jones, P.E.	*A Structural Engineer with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*
Mechanical/Electrical Engineer, EC-DG James Bartek, P.E.	*An Engineer with experience in mechanical and electrical engineering and designing structures in large river systems.*
Geotechnical/Materials Engineer, EC-GI Andy Church	*A senior Geotechnical engineer with knowledge of working on the river and working with dredging, sedimentation, and river construction*
Geotechnical Engineer, EC-GF Stefan Flynn, PE	*A senior Geotechnical engineer with knowledge of working on the river and working with dredging, sedimentation, and river construction*
Hydraulic Engineer, EC-HH TBD	*An H&H Engineer with experience in complex wetland restoration projects, river systems modeling using HEC-RAS, and regulated flow frequency analysis.*
Project Management, PM-M Andrew Goodall, P.E.	*A Senior project manager with experience in Corps business delivery model and project deliverables.*
Architect, EC-DF Cathy Tillberg, Registered Architect	*An Architect with experience in designing structures in large river systems.*
Cost Engineering, EC-T Mike Ballard, PE	*An experienced cost engineer*
Operations Bob Castro	*An operations structural engineer with experience in large river ecosystems and designing and maintaining structures in large river systems.*

ECO-PCX Kat McCain	*A senior Environmental Specialist with experience in large river ecosystem and wetland complex restoration projects and policy requirements.*
COST PCX George Chartouni	*A cost engineer with experience in large river ecosystem and wetland complex restoration projects*

ATTACHMENT 3 – BCOES TEAM MEMBERS AND SCHEDULE

BCOES REVIEW SCHEDULE

ITEM	BEGIN DATE – END DATE
65% BCOES Review	*March 2023 – May 2023*
100% BCOES Review	*October 2023 – January 2024*

BCOES REVIEW TEAM MEMBERS AND EXPERTISE

BCOES Team Members/Disciplines	Description of Credentials
Biddability Representative *Liz Dennison*	*A Senior contracting representative with experience in contractual requirements and specifications for structures along the river.*
Constructability Representative *Mark Pratt, P.E.*	*A senior construction representative with experience in building various types of structures along the river.*
Operability Representative *Bob Castro*	*An operations structural engineer with experience in large river ecosystems and designing and maintaining structures in large river systems.*
Environmental Representative *Rachel Fellman, P.E.*	*A senior Civil/Environmental Engineer with experience in large river ecosystem and complex restoration projects*
Sustainability Representative *Mark Cornish*	*A senior Environmental Specialist with experience in large river ecosystem and wetland complex restoration projects and policy requirements.*
Office of Council, OC Caitlin Breedlove	*A District Council representative with experience in legal review.*
Cost Engineering, EC-TE Mike Ballard	*A cost engineer with experience in large river ecosystem and wetland complex restoration projects*
Specifications, EC-TE Steve Marruffo	*A specifications representative with experience writing design specifications for structures along the river.*
Safety & Occupational Health, SO TBD	*A Safety and occupational health representative with experience safety design specifications for structures along the river.*
Real Estate, RE Martha Cox	*A Realty Specialist with experience in Federal lands and MOUs.*
Security & Law Enforcement, SL TBD	*A security and law enforcement representative with experience safety design specifications for structures along the river.*
Operations, OD-IV-05 Josh Hathaway	*An operations representative with extensive knowledge of the Lock and Dam 22 Structure.*
HTRW Specialist, EC-DN Steve Gustafson, PG	*HTRW Specialist (over 10 years' experience), experience performing and analyzing phase 1 HTRW assessments.*
Cultural, PD-P Kelsey Myers	*A senior Cultural Resource Specialist (this review may be combined under Environmental Resources).*

Architect Steve Bothell, RA	*An Architect with experience in large river ecosystem and complex restoration projects and designing structures in large river systems.*

ATTACHMENT 4 - ATR TEAM MEMBERS AND EXPERTISE AND SCHEDULE

ATR REVIEW SCHEDULE

ITEM	BEGIN DATE – END DATE
35% ATR	*August 2022 – September 2022*
Design Risk Assessment Report	*August 2022 – September 2022*
65% ATR	*March 2023 – May 2023*
Final Design Risk Assessment Report	*October 2023 – January 2024*
ATR on Final Implementation Documents	*October 2023 – January 2024*
Final Risk Assessment Report	*October 2023 – January 2024*

ATR MEMBERS AND EXPERTISE

ATR Team Members/Disciplines	Description of Credentials
ATR Lead *Roger Kay P.E.*	*Roger Kay, P.E., Supervisory Hydraulic Engineer, CENWO-EDH-D, is a hydraulic engineer with over 32 years of experience in hydraulics, hydrology, and water management with USACE, and currently serves as Chief, Hydraulics Section. He received a B.S. and M.S. from Iowa State University in Agricultural Engineering with an emphasis in Soil and Water. As a research assistant at ISU, he designed and oversaw installation of the Ag Drainage Research and Demonstration Site for water quality research. As a civil engineer with USACE, he has worked on numerous FRM and ecosystem restoration feasibility studies, as well as numerous dam safety related studies including SPRA, IES, and DSMS. He has also been an ATR reviewer on a number of IES and DSMS reports and a consistency reviewer for PA and SQRA reports, as well as an ATR reviewer on multiple FRM and ecosystem restoration projects for hydrology, hydraulics, risk management and ice engineering. Mr. Kay previously served as a regional technical specialist in hydrology with USACE and has authored several publications.*

Structural Engineer *Kalvin Kalafut*	*Kalvin Kalafut, P.E., Senior Structural Engineer, CENWO-EDD-F, is a structural engineer with over 13 years of experience in the design, fabrication and inspection of Hydraulic Steel Structures including miter gates, Tainter gates, vertical lift gates, the design and inspection of flood control structures such as sheetpile walls, gravity retaining structures, and concrete flood walls. Additionally, he has experience designing and inspecting highway and pedestrian bridges. He received a B.S. from Michigan Technological University in 2009, worked immediately for Rock Island District for 9 years, then transferred to Omaha District since. Mr. Kalafut is familiar with the locks and dams of Rock Island District, and his experience with LD22 includes inspection of the service bridge, design of replacement Tainter gates, inspection of the lock during dewatering, and participation in a previous site PA. As a civil engineer with USACE, he has worked on numerous dam safety related studies such as PI, PA, SQRA, IES, DSMS and design charrette studies. He has also been trained as a co-facilitator for Pas and served as the co-facilitator for the 2017 Fort Randall PA.*
Geotechnical Engineer *Pendo Doku*	*Pendo Duku, P.E., is Geotechnical Engineer with the Corps of Engineers Omaha District (NWO) Dam Safety Production Center (DSPC). Pendo graduated from the University of Washington in Seattle, Washington in 2001 with a Bachelor of Science degree. He also holds Masters and Doctorate degrees from the University of California Los Angeles (UCLA) which were awarded in 2003 and 2007, respectively. Pendo has worked for the U.S Army Corps of Engineers (USACE) since 2010. Prior to joining the DSPC in 2022, Pendo the Dam Safety Program Manager (DSPM) for the Kansas City District (NWK) and Cadre Lead on a team which is responsible for performing risk assessment of Dams and Levees across the country. Previous experiences on projects includes analyzing the impact of degradation in the Missouri River channel bed on the stability of the Kansas City levees, designing levee raise alternatives for the City of Manhattan levee in Manhattan, KS, performing risk assessments, serving on Agency Technical Review (ATR) teams on dam risk assessments and Section 205 studies, and facilitating risk assessment studies.*

Hydraulic Engineer *Jesse Brown*	*Jesse Brown, CENWO-EDH-D. Licensed Professional Engineer (PE) and project delivery team design member on a variety of feasibility studies, dam and levee safety studies, and hydraulic design work primarily in Civil Works, including projects predominately addressing flood risk mitigation and reduction, and dam and levee safety risk analysis. Primary responsibilities include lead engineer roles for hydraulic modeling, design analysis, technical assistance, risk assessments, dam and levee inspections, and review and evaluation of hydraulic and hydrologic data and designs. Develops products for communicating flood risk such as floodplain mapping, 1D, 2D and 3D numeric modeling, physical modeling, and reports or designs that address dam and levee safety risk.*
Mechanical Engineer *Cory Fosmer*	*Cory Fosmer, P.E., CENWO-EDD-A, is a mechanical engineer with 21 years of experience with the Corps of Engineers. He has worked primarily on Heating, Ventilating, and Air Conditioning (HVAC) design for Military Construction projects. He received a B.S. from the University of Nebraska at Lincoln in Mechanical Engineering and has been a registered Professional Engineer in the state of Nebraska since 2006. Cory is proficient in several programs used for heating and cooling load calculations, energy modeling, computer aided design and drafting, and system sizing.*
Civil Engineer *Roger Kay. P.E*	*Roger Kay, P.E., Supervisory Hydraulic Engineer, CENWO-EDH-D, is a hydraulic engineer with over 32 years of experience in hydraulics, hydrology, and water management with USACE, and currently serves as Chief, Hydraulics Section. He received a B.S. and M.S. from Iowa State University in Agricultural Engineering with an emphasis in Soil and Water. As a research assistant at ISU, he designed and oversaw installation of the Ag Drainage Research and Demonstration Site for water quality research. As a civil engineer with USACE, he has worked on numerous FRM and ecosystem restoration feasibility studies, as well as numerous dam safety related studies including SPRA, IES, and DSMS. He has also been an ATR reviewer on a number of IES and DSMS reports and a consistency reviewer for PA and SQRA reports, as well as an ATR reviewer on multiple FRM and ecosystem restoration projects for hydrology, hydraulics, risk management and ice engineering. Mr. Kay previously served as a regional technical specialist in hydrology with USACE and has authored several publications.*

Biologist *Clayton Ridenour*	*Clayton Ridenour, Environmental Resources Specialist, CENWO-PMA-C, is a Biologist with over 21 years of professional experience in fisheries and riverine ecology. He currently serves in the Cultural and Environmental Resources Section of the Planning Branch at the Omaha District. He received his B.S. in Fisheries and Wildlife from the University of Nebraska-Lincoln and M.S. from the University of Missouri-Columbia with emphasis on fisheries and river ecology. He serves as environmental lead on USACE projects with specialized experience in aquatic ecosystem restoration and fish ecology. He has also written and reviewed numerous peer reviewed articles in the professional literature, and contributes specialized expertise in statistical data analysis and modeling to solve biological problems. Mr. Ridenour is responsible for formulating ecosystem restoration and mitigation plans, project management, design and specifications of environmental improvement projects including monitoring and adaptive management, and construction oversight.*
Electrical Engineer *Nick Scott*	*Nick Scott, P.E., Electrical Engineer, CENWO-EDD-C, is an electrical engineer with over 17 years of experience in electrical engineering experience between USACE and STRATCOM. He received a B.S. from the University of Nebraska Lincoln/Omaha in Computer Engineering and a M.S. from the University of Nebraska Lincoln in Telecommunication Engineering. Nick is licensed as a computer and electrical engineer with the state of Nebraska. As an electrical engineer with STRATCOM, he served as the senior electrical engineer performing operations and maintenance (O&M) duties, repair, replacement and upgrade of complex electrical systems in support critical command, control, computers, communications and intelligence facilities. As an electrical engineer with USACE, Nick served in Construction Division at the STRATCOM Resident Office providing technical advice, assistance and direction to the Technical Engineering Section on matters involving interpretation and construction application of plans, specifications, shop drawings, problem resolution, installation, trouble shooting and testing of mechanical/electrical features, in particular; uninterruptable power supply (UPS) systems, power monitoring system, protective distribution systems (PDS), high altitude electromagnetic pulse (HEMP), telecommunications systems, electronic security systems (ESS), and electrical systems. Nick's current assignment is in Engineering Division as an electrical engineer in the Electrical Design Section developing and writing technical specifications, reports, man hour estimates, schedules and drawings necessary for complete electrical designs for Civil and Military projects.*

Architect *Karen Jarvis*	*Karen Jarvis, CENWO-EDD-G, is a registered architect and technical team lead. She currently also serves as the Omaha District Sustainability Coordinator for MILCON projects. She has over 32 years of architecture experience in design, construction documentation, and team management on new construction and renovation building projects. She received her Bachelor of Architecture degree from the University of Arizona. Ms. Jarvis has been with USACE for 11 years in the Omaha District and Europe District. As an architect, she has designed, reviewed, and managed multiple building projects such as fire stations, hangars, squadron operations facilities, and secured facilities. With the Europe District, she was the technical team lead for European Defense Initiative projects for ex-Soviet Bloc countries, reviewed Department of Defense Education Activity (DoDEA) school projects, programmed family housing in Italy, and programmed and reviewed humanitarian assistance projects in Europe and Africa. Prior to working for the Corps, she spent ten years in private industry and nine years as the base architect at U.S. Army Yuma Proving Ground.*

ATTACHMENT 5

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for *NESP Lock and Dam 22 – Fish Passage*. The ATR was conducted as defined in the Project Review Plan to comply with the requirements of ER 1165-2-217. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks$_{sm}$

SIGNATURE

Roger L. Kay ATR Team Leader *CENWD-RBE*	Date

SIGNATURE

Rachel K. Hawes Project Manager *CEMVR-PM-M*	Date

SIGNATURE

Name Review Management Office Representative *Office Symbol*	Date

SIGNATURE

Name Architect – Engineer (A-E) Project Manager *Office Symbol*	Date

ATTACHMENT 6

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *Describe the major technical concerns and their resolution.*

As noted above, all concerns resulting from the ATR of the Project have been fully resolved.

SIGNATURE

_____ _____

Roger Perk, P.E. Date
Chief, Engineering Division
CEMVR-EC

(Add appropriate additional signatures (Operations, Construction, AE principal for ATR solely conducted by AE, etc.) and/or modify to accommodate local organizational structure.)

ATTACHMENT 7

RATIONALE NOT TO CONDUCT A TYPE II IEPR/SAR

See the attached Type II IEPR (SAR) exclusion determination.

Type II IEPR (SAR) Exclusion Determination

Per ER 1165-2-217, two factors mandate an SAR and three additional factors should be considered in determining whether or not an SAR should be conducted. Table 1 discusses these factors and their relevance to the projects listed in table 2. If there is any concern regarding the rationale presented, a vertical team should be assembled upon request.

Table 1: Factors and project specific relevance

Factor		Relevant to This Project
1) Is the project justified by life safety?	Mandate	No. The 2018 Periodic Assessment for this project resulted in an HQ-approved DSAC 5. The PA found no life safety risk and consequences are solely economic, based on impacts to navigation. In 2020, CEMVR conducted a risk-informed design PFMA considering the PFMs associated with the fish passage project. Many PFMs were discussed. The team concluded, "The fish passage structure does not increase the overall risk at Lock and Dam 22 as determined by the 2018 PA."
2) Would the project's failure pose a significant threat to human life?	Mandate	No. The 2018 Periodic Assessment for this project resulted in an HQ-approved DSAC 5. The PA found no life safety risk and consequences are solely economic, based on impacts to navigation. In 2020, CEMVR conducted a risk-informed design PFMA considering the PFMs associated with the fish passage project. Many PFMs were discussed. The team concluded, "The fish passage structure does not increase the overall risk at Lock and Dam 22 as determined by the 2018 PA."
3) Does the project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices?	Consider	Materials and techniques employed in the construction of the fish passage are commonly used on Upper Mississippi River lock and dam projects.

4) Does the project design require redundancy, resiliency, or robustness?	Consider	The project design has redundancy applied in a biological aspect to help control ANS. LD 22 including the fish passage project does not have life safety implications, will not include remote operations, and has low risk associated with critical infrastructure protection and resilience. Therefore, the fish passage project design does not require redundancy, resiliency, or robustness.
5) Does the project have unique construction sequencing or a reduced or overlapping design construction schedule?	Consider	The construction is routine using proven construction methods.

Background Information:

Lock and Dam 22 is located at river mile 301.2 on the UMR near Saverton, Missouri, between Ralls County, Missouri, and Pike County, Illinois. The average lift at Lock and Dam 22 is approximately 11 feet. The project area is located in Congressional District 9 in Missouri and District 17 in Illinois. The project is 100% Federal funded and there is no non-Federal sponsor.

The need for the Lock and Dam 22 Fish Passage Improvement Project was identified in the Final Integrated Feasibility Report (FIFR) and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study U.S. Army Corps of Engineers, September 24, 2004 (2004 Feasibility Study)to meet the ecosystem restoration needs of the system.. The Lock and Dam 22 Fish Passage Improvement Project (Project) is the first of a series of projects to restore longitudinal habitat connectivity for the many species of native migratory fishes in the Upper Mississippi River (UMR). Enabling long distance migration is important to fulfill seasonal and life stage requirements for river fishes. Fish undergo seasonal movements in rivers for reproduction, feeding, and for finding thermal refugia during winter. Fish migrations are the annual movements of fish populations between different habitat areas. Fish passage is the movement of fish past an obstacle, such as a dam in a river, and fishways are constructed channels designed to provide hydraulic connections suitable for fish to pass dams without undue stress, delay or injury.

The primary purpose of the Lock and Dam 22 Fish Passage Project is to increase opportunity for upriver fish passage, thereby increasing access to upstream mainstem river and tributary habitats. Increased access to upriver habitat should result in an increase in the size and distribution of native migratory fish populations. The secondary purpose of this project is to monitor, evaluate, learn from, and adapt future fish passage projects using lessons learned from this initial project. There are significant gaps in knowledge for this project given our limited understanding of: natural fish movements, fish movements in response to flow conditions, the diversity of fish species and their habitat requirements, and the novelty of a fish passage for the UMR. This information is needed for project planning and design to determine if the project

objectives are met and to apply lessons learned to future fish passage projects through adaptive management.

The Lock and Dam 22 Fish Passage Improvement Project includes a rock ramp with 200 foot bottom width, resulting in a gain of 234.6 average annual habitat units. The Project First Cost is $122,110,000 at a FY 2021 price level (Oct 2020). The costs are expressed as Project First Costs and include construction, contingencies, engineering, preconstruction engineering, and design, and construction management. When interest during construction is added, the total investment cost is $126,712,000.

A dam safety risk assessment on this project has been completed and HQ approved it as a DSAC 5. There is no life safety risk and consequences are solely economic, based on impacts to navigation. This project will not increase the risk or have any influence on a future DSAC reclassification.

Modifications to existing dams impose additional dam safety risks to people and property upstream and downstream of the project. Risk is defined as a function of the loading condition, expected performance of the dam, likelihood of failure, and the expected consequences. Risk increases with an increase in the likelihood of failure or an increase in the potential consequences. Modifications to existing dams should not increase the risks associated with the project.

USACE has implemented a Periodic Assessment (PA) program to assess the risks associated with a dam failure at all projects across the inventory. The results of the periodic assessment are used to re-evaluate the DSAC rating assigned during the previous Screening for Portfolio Risk Analysis (SPRA) process. Dam safety risks include life loss and economic consequences associated a dam failure. The PA program also informs the hazard potential classification, the rating for each dam based on the potential consequences of failure. Dams classified as High Hazard Potential will result in the loss of life as a result of failure. Significant Hazard Potential dams will result in a disruption of essential or critical facilities or access, major or extensive property losses to public and private facilities, or major or extensive environmental losses where mitigation is required or impossible.

Lock and Dam 22 went through a PA in 2018 as a Significant Hazard Potential dam and the results of that risk assessment can be found in the Lock and Dam 22 (MO10305) Mississippi River, Missouri Navigation Lock & Dam Periodic Inspection No. 11 Periodic Inspection Assessment NO. 01 report. The PA re-evaluated the deficiencies and failure modes identified in the 2008 SPRA and identified additional potential failure modes (PFMs) that could result in the loss of damming surface (i.e.. loss of pool) or a loss of navigation due to an emergency closure of the lock for an extended period of time. The PA identified 44 PFMs during the risk assessment. Those PFMs with the highest risk were carried forward as risk drivers and used to create a risk matrix and inform the DSAC. The risk driver PFMs identified at Lock and Dam 22 include a barge/vessel accident that blocks one or more dam gates from closing, a trunnion friction failure of a Tainter gate, a barge impact of the main lock chamber miter gates resulting in a loss of service of the lock, and a miter gate embedded anchorage fatigue failure resulting in a loss of service of the lock. None of the risk drivers were associated with the overflow spillway or the storage yard embankment.

The 2018 PA conducted at Lock and Dam 22 did not include an assessment of the fish passage feature as this feature was not a part of the project at the time of the risk assessment. To address the dam safety concerns of the fish passage feature, a Potential Failure Mode Analysis (PFMA) was performed as part of the FIFR to identify PFMs associated solely with the fish passage project. This analysis followed the USACE risk-informed design process but was completed using only Rock Island District personnel and did not determine the potential consequences associated with these PFMs. PFMs were identified and justification for excluding them as risk drivers were documented or design considerations were listed to be addressed by the design team. The fish passage structure does not increase the risks at the dam and does not change the hazard potential classification.

These factors support the determination that an IEPR Type II SAR is not required for the project.

Recommendation Regarding Type II IEPR (SAR): The NESP Lock and Dam 22 Fish Passage project does not represent a significant threat to human life or public safety, nor does it involve the use of innovative materials or techniques; the need for design redundancy, resiliency, and robustness; or the use of unique construction sequencing or overlapping design construction sequencing. These factors support the determination that an IEPR Type II SAR is not required for this project.

Roger A. Perk, P.E.
Chief, Engineering & Construction
CEMVR-EC

ATTACHMENT 8

REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page/Section Number